

Attorney Docket No. 82996
Customer No. 23523

GUN-ARMED COUNTERMEASURE

TO ALL WHOM IT MAY CONCERN:

BE IT KNOWN THAT (1) THOMAS J. GIESEKE and (2) ROBERT KUKLINSKI, citizens of the United States of America, employees of the United States Government, and residents of (1) Newport, County of Newport, State of Rhode Island and (2) Portsmouth, County of Newport, State of Rhode Island, have invented certain new and useful improvements entitled as set forth above of which the following is a specification.

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3 **GUN-ARMED COUNTERMEASURE**
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5 **STATEMENT OF GOVERNMENT INTEREST**

6 The invention described herein may be manufactured and used
7 by or for the Government of the United States of America for
8 governmental purposes without the payment of any royalties
9 thereon or therefor.
10

11 **BACKGROUND OF THE INVENTION**

12 **(1) Field of the Invention**

13 The present invention relates to a weapons system designed
14 to defeat torpedoes and other underwater targets and more
15 particularly to a gun-armed countermeasure device.

16 **(2) Description of the Prior Art**

17 Presently, torpedo countermeasure systems can be grouped
18 into two categories - passive and hard kill. Passive
19 countermeasure systems rely upon creating distractions to
20 attacking torpedoes causing the torpedoes to fail to locate
21 their target. Hard-kill systems, like the anti-torpedo torpedo,
22 physically damage attacking torpedoes so they cannot reach their
23 target.

1 Passive countermeasure systems are common on surface ships
2 and submarines with a diameter of the systems being either three
3 and a quarter inches or six and a quarter inches. Special
4 launchers have been developed for these countermeasure systems
5 and have been integrated into most naval platforms. As such, an
6 inventive countermeasure system which can be launched from
7 existing launchers is a more receptive concept than a
8 countermeasure system which requires a varying sized launcher or
9 a different launcher arrangement.

10 Underwater gun systems have been considered in the hard-
11 kill countermeasure category as anti-mine and anti-torpedo
12 devices. The system is generally composed of projectiles for
13 use underwater, a gun, a ship-mounted turret, a targeting
14 system, and a combat system. Undersea targets are identified and
15 localized with the specialized targeting system. The combat
16 system provides the control commands to direct the ship-mounted
17 turret to point the gun towards the target. The underwater gun
18 then shoots the projectiles which are specially designed for
19 neutralization of undersea targets at a relatively long range
20 (typically 200 meters).

21 An improvement on existing countermeasure systems would be
22 an autonomous countermeasure device for defeating torpedoes and
23 other underwater threats.

1 **DESCRIPTION OF THE PREFERRED EMBODIMENT(S)**

2 Referring now to FIG. 1 of the drawings, the countermeasure
3 device 10 of the present invention is deployed as a cylindrical
4 module 12. The module 12 of the type shown is preferably equal
5 in diameter and length to a six and a quarter inch
6 countermeasure device; however, the module can have other
7 dimensions based on anticipated operating conditions. The
8 module 12 is autonomous in that the module is not tethered to a
9 ship or other platform which the device 10 is protecting.

10 Referring to FIGS. 1 and 2, the central portion of the
11 device 10 includes a gun 14, which has a barrel 16 and a linear
12 magazine 18. Folded to the sides of the device 10 are acoustic
13 array panels 20 which can be deployed to form a large aperture
14 array that detects the underwater target. In addition to the
15 panels 20, small propulsors such as thrusters 22 and inflatable
16 chambers 24 are folded along the sides of the device 10. The
17 thrusters 22 and the inflatable chambers 24 are deployed to keep
18 the device 10 from sinking and to maneuver the device into a
19 firing position as will be discussed further.

20 The acoustic array panels 20 are used to detect and
21 localize the undersea targets, such as torpedoes (not shown).
22 During a launch or some maneuvers of the device 10, the array
23 panels 20 are folded against the device. Acoustic array
24 elements 26 are positioned along the span of each acoustic array

1 panel 20. The array elements 26 can be any suitable elements
2 known to those skilled in the art and operate actively or
3 passively to detect and localize the undersea target. After
4 launch or during other maneuvers of the device 10, the array
5 panels 20 are mechanically deployed to a predetermined angle
6 with respect to a countermeasuring axis.

7 In order to minimize the range to the undersea target and
8 to point the gun 14 at the undersea target, a plurality of
9 propulsors, such as thrusters 22, are provided to orient the
10 device 10. The individual thrusters 22 are located along each
11 side of the device 10. The thrusters 22 are initially stowed
12 within the dimensional constraints of the launcher.

13 After launch, the thrusters 22 are folded out to provide
14 positioning and maneuvering of the device 10.

15 While any suitable thruster known in the art may be
16 utilized, it is preferred to use flapping foils to provide the
17 thrust. Flapping foils are preferred over standard propeller
18 thrusters since they can provide large thrusts and are easily
19 stowed. Any suitable means known in the art may be used to flap
20 the foils forming the thrusters 22 and to move the thrusters
21 between the stowed position and the folded out position.

22 The components, described above, within the device 10 make
23 the device much denser than water. Consequently, added buoyancy
24 is required to prevent the device 10 from sinking or requiring

1 excessive thrust to maintain its depth. Buoyancy is added to
2 the device 10 by the inflatable chambers 24 distributed about
3 the device to give the device a center of mass nearly coincident
4 with the center of buoyancy. The distribution of the inflatable
5 chambers 24 improves the maneuvering capability of the device 10
6 as well as allowing the device to be recovered, reloaded, and
7 reused. The buoyancy by the inflatable chambers 24 further
8 allows the device 10 to hover in an undersea environment at
9 varying depths. Any suitable inflatable module known in the art
10 may be used for the inflatable chambers 24.

11 The destructive mechanism of the device 10 is the gun 14.
12 The gun 14 fires supercavitating underwater munitions capable of
13 traveling significant underwater ranges (typically 200 meters),
14 and capable of carrying destructive energy to their target, as
15 either kinetic or explosive energy. Water may be initially
16 cleared from the gun 14 with compressed air from a compressed
17 air source 30. A burst of projectiles then follows with
18 multiple bursts possible for firing from the device 10.

19 In operation, the device 10 is deployed from a
20 countermeasure launcher (not shown) when an attack from a
21 torpedo or some other threat is perceived. The device 10
22 immediately deploys its thrusters 22, inflatable chambers 24,
23 and acoustic array panels 20 as discussed above. The device 10
24 then begins to scan for the threat.

1 When the threat is detected, the device 10 orients itself
2 so that the gun 14 points toward the undersea target. When the
3 undersea target is in range, compressed air from the compressed
4 air source 30 clears the barrel 16 and then a projectile is
5 fired. When the projectile is fired, the undersea target is re-
6 acquired and a subsequent projectile is fired. The range of the
7 projectiles enables the device 10 to repeatedly engage an
8 undersea target as the target approaches the vessel the device
9 is defending. After all rounds of projectiles have been
10 expended, the device 10 disarms itself and either ascends to the
11 surface of the body of water for recovery or sinks to the bottom
12 for security.

13 If the operational situation requires, the device 10 can
14 operate as a mine by sitting on the bottom or hovering near the
15 surface to target passing sea and air craft.

16 The countermeasure device 10 is a unique weapon system well
17 suited for offensive strikes against marine targets, including
18 torpedoes, mines, submarines, surface craft, etc. The device 10
19 has the unique features of being an autonomous and self-
20 contained weapons system: having the ability to simultaneously
21 maneuver and target its gun; being recoverable and reusable and
22 having multiple alternative functions as a mine or a slow-moving
23 weapon.

1 It should be noted that the gun 14 can be a "Gattling" gun,
2 a chain gun, or a single firing system. The gun 14 can be of
3 any size ranging from a small caliber gun (0.22") to a cannon
4 (6").

5 If the operational situation requires, the thrusters 22 can
6 act as inflatable devices, serving a dual purpose of buoyancy
7 and maneuvering control. Further, the buoyancy can be
8 integrated into the acoustic array panels 20.

9 It is apparent that there has been provided in accordance
10 with the present invention a gun-armed countermeasure device
11 which fully satisfies the objects, means and advantages set
12 forth hereinbefore. While the present invention has been
13 described in the context of specific embodiments thereof, other
14 alternatives, modifications, and variations will become apparent
15 to those skilled in the art having read the foregoing
16 description. Accordingly, it is intended to embrace those
17 alternatives, modifications, and variations as fall within the
18 broad scope of the appended claims.

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